

I. Amendments to the Claims

This listing of claims replaces without prejudice all prior versions and listings of claims in the application:

Listing of Claims:

1. (Currently Amended) A moveable lock ring apparatus for use in an injection mold, the lock ring apparatus comprising:

an inner sidewall surface including an area for sealing and aligning with a complementary surface on a mold core; and

an upper surface including an area for sealing and aligning with a complementary surface on a neck ring, and having a lifting surface for lifting a lower portion of a molded article,

said lock ring being configured for lifting a preform from the mold core during a first lifting operation, and configured to separate from the neck ring during a second lifting operation, said neck ring being configured so that at least a portion thereof (i) maintains non-sliding contact with the preform during the first lifting operation, and (ii) moves in a direction substantially transverse to the lifting direction a predetermined period of time greater than zero after said second lifting operation has begun.

2. (Original) The moveable lock ring apparatus of Claim 1, wherein said lifting surface contacts substantially 50% of a sealing surface of said lower portion of the molded article.

3. (Currently Amended) A moveable lock ring apparatus for use in an injection mold, the lock ring apparatus comprising:

an inner sidewall surface including an area for sealing and aligning with a complementary surface on a mold core;

an upper surface including an area for sealing and aligning with a complementary surface on a neck ring, and having a lifting surface for lifting a lower portion of a molded article,

said lock ring being configured for lifting a preform from the mold core during a first lifting operation, and configured to separate from the neck ring during a second lifting operation, said neck ring being configured so that at least a portion thereof moves in a direction substantially transverse to the lifting direction after said second lifting operation has begun; ~~The moveable lock ring apparatus of Claim 1, further comprising~~

a first lifting structure configured to move said lock ring and neck ring a first distance in a lifting direction $[[,]]$; and

a second lifting structure configured to allow said lock ring to remain stationary and to move said neck ring a second distance in the lifting direction from said lock ring.

4. (Original) The moveable lock ring apparatus of Claim 1, wherein said first distance is different from said second distance.

5. (Currently Amended) An ejection apparatus for use in an injection mold, said ejection apparatus comprising:

a lock ring including an inner surface with an area for sealing and aligning with a complementary surface of ~~on~~ a core, and an upper surface with an area for sealing and aligning with a complementary surface on a neck ring, said upper surface including a lifting structure for lifting a portion of a molded article; and

a neck ring including a contoured inner surface, wherein said neck ring comprises at least two neck ring portions,

said lock ring being configured for lifting a molded article from the core during a first lifting operation, and configured to separate from the neck ring during a second lifting operation by the neck ring,

at least one of said neck ring portions being configured to (i) maintain non-sliding contact with the molded article during the first lifting operation, and (ii) be movable in a direction non-parallel to the lifting direction a predetermined distance greater than zero after the beginning of the second lifting operation.

6. (Original) The ejection apparatus of Claim 5, wherein said contoured inner surface of said neck ring engages corresponding contoured features of the said molded article.

7. (Currently Amended) An ejection apparatus for use in an injection mold, said ejection apparatus comprising:
a first lifting structure including an inner surface with an area for sealing and aligning with a complementary surface on a core, and an upper surface with an area for sealing and aligning with a complementary surface on a second lifting structure, said upper surface of said first lifting structure being configured to lift a molded plastic preform from the injection mold in a lifting direction for a first period of time, the lower portion of the molded plastic preform lying in a plane substantially perpendicular to the lifting direction; and

a second lifting structure including an inner surface configured to non-slidingly lift an outer surface of

the molded plastic preform from the injection mold in the lifting direction for a second period of time, the outer surface of the molded plastic preform lying in a plane substantially parallel to the lifting direction, at least a portion of the second lifting structure being configured to move in a direction non-parallel to the lifting direction after the second lifting structure inner surface begins to lift the outer surface of the molded plastic preform.

8. (Previously Presented) The ejection apparatus according to Claim 7, wherein said first lifting structure lifts the molded plastic preform relative to a mold core for the first period of time, which is less than the second period of time.

9. (Previously Presented) The ejection apparatus according to Claim 8, wherein the molded plastic preform has a neck portion having a support ledge, threads, and a circular sealing surface, said circular sealing surface having a circular engagement portion lying in the plane substantially perpendicular to the lifting direction, and wherein said first lifting structure is configured to engage substantially greater than fifty percent of the circular engagement portion.

10. (Previously Presented) The ejection apparatus according to Claim 9, wherein said second lifting structure has portions which respectively engage the molded plastic preform neck portion support ledge and the preform neck portion threads.

11. (Previously Presented) The ejection apparatus according to Claim 7, further comprising first moving structure configured to move said first lifting structure a first distance in the lifting direction, and a second moving structure configured to move said second lifting structure a second distance in the lifting direction, the second distance being different than the first distance.

12. (Previously Presented) The ejection apparatus according to Claim 7, wherein said second lifting structure applies a shear force to the molded plastic preform in the lifting direction, and wherein said first lifting structure applies a compressive force to the molded plastic preform in the lifting direction.

13. (Currently Amended) A preform ejecting apparatus provided in an injection mold, said preform ejecting apparatus comprising:

an injection mold core comprising structure complementary to an inner surface of a lock ring;

a said lock ring including ~~an~~ inner surface structure for sealing and aligning with said core, and including an upper surface structure complementary to a lower surface on a neck ring, said upper surface structure including a lifting structure for lifting a portion of a molded article; and

a said neck ring including a lower surface structure for sealing and aligning with said lock ring, and including a contoured inner surface,

said lock ring being configured to be translated with respect to the injection mold core during a first translation, and said neck ring being configured to be translated in first and second different directions with respect to the lock ring during a second translation, thereby removing the molded article from the injection mold, said neck ring being configured to be in non-sliding contact with the molded article during the second translation.

14. (Original) The preform ejecting apparatus of Claim 13, wherein said neck ring comprises at least two neck ring portions.

15. (Original) The preform ejecting apparatus of Claim 13, wherein said lock ring contacts a sealing surface of the molded article over at least 50% of said sealing surface.

16. (Currently Amended) An injection mold assembly comprising:

a cavity insert provided in a cavity plate;

an injection mold core including structure complementary to an inner surface of a lock ring;

a lock ring including an inner surface structure for sealing and aligning with said core, and including an upper surface structure complementary to a lower surface on a neck ring, said upper surface structure including a lifting structure for lifting a portion of a molded article; and

a neck ring including a lower surface structure for sealing and aligning with said lock ring, said neck ring being mounted on movable slides;

a core plate;

an ejector plate;

a stripper plate that supports said movable slides;

a first actuating apparatus for equally displacing said ejector plate and said stripper plate with respect to said core plate, while said core plate remains stationary, said neck ring maintaining non-sliding contact with the molded article during the equal displacement; and

a second actuating apparatus for displacing said stripper plate with respect to said ejector plate, and for moving at least a portion of said neck ring in a direction transverse to a lifting direction of said stripper plate a

predetermined period of time greater than zero after said stripper plate has begun to displace with respect to said ejector plate.

Claim 17 (Cancelled)

18. (Currently Amended) The injection mold assembly of Claim 16 ~~17~~, wherein the displacement of said ejection plate and said stripper plate causes said lock ring and said neck ring to be equally displaced relative to said core, and

wherein the displacement of the stripper plate with respect to the ejector plate causes said neck ring and said molded article to be displaced relative to said lock ring.

19. (Currently Amended) A method of ejecting a preform from an injection mold, comprising the steps of:

actuating at least one piston to separate an ejector plate and a stripper plate from a core plate, thereby separating an inner sidewall of a lock ring and an open end of a preform from a curved notch on the outer surface of a core, where said inner sidewall of said lock ring and said core are sealed and aligned during a molding operation;

actuating at least one connecting rod to separate said stripper plate from said ejector plate, thereby separating a neck ring and the preform from an upper surface

of said lock ring, wherein said neck ring maintains non-sliding contact with the preform throughout the separation of the neck ring from the lock ring, wherein ~~where~~ a first portion of said upper surface of said lock ring is sealed and aligned with said neck ring during a molding operation, and wherein a second portion of said upper surface of said lock ring is a lifting surface for lifting the preform during the step of actuating said at least one piston; and

moving at least a portion of the neck ring in a direction non parallel to the separation of stripper plate and the ejector plate.

20. (Currently Amended) A control apparatus for ejecting a preform from an injection mold, comprising:

at least one piston configured to move an ejector plate with respect to a core plate, causing an inner surface of a lock ring sealed and aligned with respect to a mold core to be displaced relative to said mold core, while a lifting surface on an upper surface of the lock ring engages a lower surface of the preform, causing the preform to be displaced relative to said mold core;

at least one connecting rod configured to move a stripper plate with respect to said ejector plate, causing a lower surface of a neck ring sealed and aligned with respect to the lock ring to be displaced relative to said lock ring, while an inner surface of said neck ring non-slidingly

engages a contoured surface of the preform, causing the preform to be further displaced relative to the mold core; and

a control assembly for regulating the actuation of the at least one piston and the at least one connecting rod, and for causing at least a portion of the neck ring to move in a direction substantially parallel to the lifting surface, so as to eject the preform from the injection mold.

21. (Original) The control apparatus of Claim 20, wherein said piston and connecting rod are provided as a unified structure.

22. (Original) The control apparatus of Claim 20, wherein said piston and connecting rod are provided as separate structure.

23. (Original) The control apparatus of Claim 20, wherein said piston and connecting rod are powered by a power source selected from the group consisting of electrical motors, pneumatic motors or cylinders, and hydraulic motors or cylinders.

24. (Currently Amended) An injection mold stack assembly comprising:

a cavity insert;

an injection mold core including structure complementary to an inner surface of a lock ring;

a lock ring having an inner surface structure for sealing and aligning with said core, and having an upper surface structure complementary to a lower surface on a neck ring, said upper surface structure including a lifting structure for lifting a portion of a molded article;

a neck ring having a lower surface structure for sealing and aligning with said lock ring; and

movement structure configured to move (i) the lock ring and the neck ring together in a lifting direction while the neck ring maintains non-sliding contact with the molded article; (ii) the neck ring from the lock ring in the lifting direction, and (iii) two halves of the neck ring in a direction non-parallel to the lifting direction after the beginning of the movement of the neck ring from the lock ring.